except perhaps that reported by Dr. J. M. Harlow. (See number of this Journal for April 1849, p. 546, and also by Dr. H J. Bigelow in number for July, 1850, p. 13.) Dr. Jeffries Wyman informed me, in 1860, that this man had been a few years previously still in good health, and employed as a stage driver in Peru. It would be interesting to know if he has still escaped the usual fate of all those who have had mutilated brains, epilepsy, or insanity.

Dec. 4. Case of the late Dr. C. W. Pennock.—Dr. J. C. MORRIS read the following paper:—

It was the earnest and frequently expressed desire of this highly esteemed gentleman that his case should be studied with care, and the results recorded for the advancement of science and the possible alleviation of the sufferings of those who may be hereafter similarly afflicted. In accordance, therefore, with this desire and with regret only for a feeling of inadequacy on my part to do full justice to many of its remarkable features, the following account is presented.

Dr. Pennock was a man of large bony frame and excellent muscular development, of cheerful and benevolent disposition, clear, comprehensive mental perceptions, and in the fullest sense a philanthropist. Born of a vigorous, healthy, and long-lived family, and reared in the country under circumstances of comparative affluence, he at first devoted himself to agriculture and placed himself upon the farm, where he exerted himself so laboriously in ordinary farm labour as to give rise to great anxiety lest he should ruin his health. Not content with this, he opened a school for coloured people (in whose welfare he was deeply interested), in the evenings, teaching it himself after the labours of the day. These facts are mentioned as an index of the character of the man and as exhibiting the whole heartedness with which he threw himself into whatever he undertook. Finding the sphere thus opened before him insufficient for his benevolent wishes, he entered upon the study of medicine, which he prosecuted with the utmost zeal at the University of Pennsylvania, and, after graduating in 1829, visited Paris, where he remained until 1833. He then returned to Philadelphia to engage in practice. The assiduity with which he performed his duties in the Dispensary and at the Almshouse will be readily recalled by his colleagues: his attentions to the sick poor were unwearying and incessant. But it was to the scientific pursuit of his profession that he turned with the greatest eagerness, devoting himself to the study of auscultation and percussion, which were then attracting the attention of the medical public. Dr. Pennock repeated the experiments and vivisections of Dr. Hope and edited an edition of his works with copious notes. In the midst of these labours, he began in 1843 to complain of a sense of weight and numbness in his legs, which obliged him to forego his active duties and endeavour to recruit his failing powers. Everything which rationally promised relief in the way of treatment was tried until 1849, when he finally determined to withdraw from active life. Of his condition at that time and subsequently, Dr. Worthington, of West Chester, under whose care he placed himself, writes:—

"In the year 1849 Dr. Caspar W. Pennock came to reside in Howellville, Delaware County, having left the city to enjoy a country residence, and receive the benefits which such a location might afford. He had then been indisposed for a period of six years. During the year 1843 he was taken with a numbness in the left leg between the knee and ankle. The sensation produced was similar to that of a tight band around the leg about three or four inches in width. He

had been laboriously occupied during the summer with professional duties, so as to tax, to an unusual extent, both his mental and physical powers. He also suffered at times, during the season, with a slight diarrhœa. The feeling of numbness and sense of heaviness in the limb gradually increased under the treatment adopted, which consisted principally of counter-irritation by mustard and dry cups. Galvanism was also used. No treatment of this kind seemed to control the disease, which gradually increased until it extended to the whole limb. He was induced to try the '*cold water*' treatment, which seemed to retard the progress of the disease more than any other remedy. The disease, however, still advanced, and in the course of a few years began to exhibit itself in the right leg, presenting the same symptoms as had been observed in the left. While employing the water treatment, it was accompanied with much exercise, and especially on foot, which probably was rather injurious than otherwise.

In 1853 he was attacked with pain, soreness, and swelling of the lower extremities, accompanied with febrile symptoms, and presenting all the ordinary symptoms of *phlegmasia dolens*. It ran a course of about three weeks, and under the usual treatment for this disease subsided—leaving him, however, ever afterwards unable to walk. From that time he was entirely confined either to the sitting or horizontal position. For several years the warm weather seemed to diminish his strength and increase his paralysis, so that during the winter he did not recover the loss sustained by the heat of summer.

When the disease reached the upper extremities, it began in the left arm, this being the side which was first and most affected. From the left arm it gradually extended to the right, until finally both arms became so much disabled as to prevent him from feeding himself during the last ten years of his life. Sensation was never lost in the paralyzed limbs, though somewhat diminished.

Little treatment for the paralysis was used in his case during the time he was under my observation. A careful system of living, strict attention to the condition of the alimentary canal, with good ventilation of his chamber, and, in suitable weather, a removal for a portion of the time into the open air—dry frictions to the limbs, which were faithfully applied, constituted the principal means employed in the medical treatment.

About five years before his death he had an attack of retention of urine, which was regarded as a partial but temporary paralysis of the bladder. The catheter had to be used for several days. With the use of diuretics, consisting of an infusion of buchu and uva ursi, and sweet spirits of nitre, this disease soon subsided, without any return.

A remarkable feature in his case, with such a long and constantly increasing paralysis, was the uninterrupted brightness of his intellect. His mind was always active, taking a deep interest in his profession, to which he was passionately devoted; and manifesting the deepest sympathy for the afflicted, and the warmest love for his numerous friends, with an earnest and patriotic solicitude for his country in her trials during the late rebellion. This clear and happy state of mind continued up to the latest period of his life.

About three weeks before his death he was attacked with other symptoms, and in my absence became the patient of Dr. Jacob Price, to whom I must refer for an account of his last illness."

Dr. Price writes us, "I was called to Dr. Pennock on the 20th of March last, and found him labouring under symptoms of influenza; there was also deficient action of the kidneys, and some tenderness to the left of and below the umbilicus, with a tendency to diarrhœa. The febrile action was slight. The bronchial symptoms abated somewhat after a few days, but the enteric steadily increased. Tympanitis was present from the first; it was, to a certain extent, his usual condition, although now much increased. The discharges were at first somewhat feculent, occasionally a transparent, colourless mucus; later they became dark and watery—four to six daily. The intestinal pain was not severe, unless the abdomen was pressed upon or handled. The tenderness, in the region indicated, was at times exquisite. His mind, from the first, was impressed with the idea that his disease was typhoid fever. The enteric tenderness, diarrhœa, tympani-

tis, bronchial disease, and sudamina (which were slightly present after the second week) gave support to this view, although the location of the tenderness, the absence of rose-coloured spots, and the condition of the tongue, did not sustain it. He was evidently, however, labouring under disease of a zymotic character. The pulse ranged from 80 to 110; his mind was always clear; his stomach was weak, and at times scarcely able to take the simplest nourishment.

Medicines (to which he was always very averse) were used sparingly. An alkaline diuretic for one day at first; afterwards strychnia one-eighth grain four times a day for several days; syr. lactucarii, with ext. cinchonæ, and, after the diarrhœa increased, bismuth, were the main measures resorted to. The strychnia seemed to control somewhat the tympanitis and the bronchial trouble, and the bismuth evidently restrained the diarrhœa. It was difficult to get him to take stimulants, and they were used to a very limited extent.

A specimen of urine, about a week before his death, showed no deposit when heated, or treated with nitric acid. Barreswil's test caused a slight flocculent green deposit, but no brown precipitate whatever. Microscopical examination showed a copious deposit of crystals of triple phosphate, and a few granules adherent endwise—probably urate of ammonia; also amorphous deposits of the same. His death occurred on Tuesday, the 16th of April, 1867, at 3 A. M. His mind was clear to the last."

Autopsy, performed April 18th, 1867, by Dr. John H. Packard, in the presence of Drs. Worthington, Price, and Massey of West Chester; notes taken by myself.

General appearance.—Body well formed—very slightly emaciated. Œdema of the left leg (slight): and also of both feet. Skin reddened on back from the neck to the sacrum. Left lateral and anterior angular spinal curvature, at 7th cervical to 2d or 3d dorsal vertebræ.

Examination of cerebro-spinal axis.—The body being placed in the prone position, an incision was made from the vertex downward, over the occiput and the spinous processes; another incision running forward behind each ear permitted the throwing forward of the scalp and downward of lateral flaps so as to expose the skull; the occipital bone was much congested; the lambdoidal and posterior part of the sagittal sutures were very vascular. A vascular spot was noticed on the right parietal bone about $1\frac{1}{2}$ inch from the sagittal and coronal sutures. On removing the calvaria a large quantity (at least six ounces) of serum (reddish from admixed blood) escaped. I believe this to have been originally clear, as that which remained in the ventricles and spinal canal was so. Some congestion of parietal arachnoid, and of pia mater. The *cerebellum* was soft in consistence, with arbor vitæ well defined; slightly congested. The *cerebrum* more vascular and rather softer than usual. Corpus callosum, fornix, and crura cerebri slightly softened; the latter were torn in being removed. Olfactory bulbs much softened so as to present a ragged appearance. Some fluid in the lateral ventricles—no third ventricle; the choroid plexus congested and presenting numerous pouches filled with serum. The surface of the lateral ventricles seemed as though somewhat softened by soaking in the serous fluid. In laying open the spinal cavity diminished mobility was noticed between the 3d and 4th and the 5th and 6th cervical vertebræ. The medulla spinalis was surrounded with a considerable amount of clear serous fluid, and congested vessels were noticed on its surface. It was laid aside, as were the corpora striata and thalami, portions of the cerebrum, the cerebellum, pons Varolii, and medulla oblongata, for microscopic investigation.

Examination of the abdomen.—On making an incision through the walls of the abdomen (the body having been replaced on the back) the

sigmoid flexure of the colon was seen very much distended with extremely offensive flatus; it rose nearly to the epigastrium, was highly congested and inflamed, in some parts almost grayish, and contained besides the flatus dark grumous bloody fluid, and a layer of coagulated blood on the mucous surface. The large and small intestines and mesentery were thickly strewn with subperitoneal tubercles of the yellow caseous form. The gall-bladder was filled with gall-stones and pus—the latter derived by a fistulous sinus from an ancient abscess probably tuberculous with firm walls and somewhat caseous contents situated in the liver. The surface of the latter presented a pit-like depression on its antero-superior surface a little to the right of the notch. The liver was softened and friable: the ramifications of capsule of Glisson well-marked. The kidneys were mottled, congested, and softened. Supra-renal capsules healthy. Atheroma of bifurcation of aorta. A good deal of serum in pericardium. The heart was much softened and degenerated—no valvular disease.

Thorax.—The left lung was adherent at base and posteriorly at the upper part. Tubercles in process of softening were found in abundance at the apices of both lungs.

Skeleton.—The whole spinal column was much softened—so that a scalpel would readily cut the bodies of the vertebræ. A piece was thus cut out of one of the lumbar vertebræ. The same condition was found in the trochanter, patella, head of the tibia, and in the tarsal bones. At the lower extremity of the sacrum was found a spinous process, apparently that of the last sacral vertebra, projecting backwards within a quarter of an inch of the skin.

Microscopical Examination.—Dr. S. WEIR MITCHELL writes as follows:—

"The portions of the nervous system submitted to me for examination were parts of both cerebral hemispheres, anterior half of cerebellum, the crura cerebri, corpus striatum, optic tubercles, and the pons. Also the medulla oblongata and the entire spinal cord, with a piece of the left brachial nerve. These specimens were in good order—had been removed two days after death—the body having been kept in ice.

The parts above named, with the exception of the spinal cord and oblong medulla, were found to be free from any very notable alteration, excepting that throughout, their bloodvessels were slightly but very uniformly affected with oleaginous degeneration. There were no evidences of pathological softening.

At the upper part of the posterior face of the medulla oblongata, in the mouth of the fourth ventricle was a small, rough concretion measuring two lines in diameter. It was irregularly rounded, and lay between the restiform bodies and posterior pyramids, where they divide to pass into the walls of the ventricle. This foreign body was imbedded in the membranes, and made such pressure on the dividing strands as distinctly to alter their form. This was best marked on the left side. No pressure was made by the mass upon the floor of the ventricle, nor were there at any of these points the least signs of inflammation.

I failed to discover any lesion in the medulla oblongata, but the cervical and dorsal regions of the spinal cord were extensively affected. When fresh, this disease presented a series of gray, translucent spots of irregular form, and, sometimes, almost perfectly transparent—a gelatinous alteration, atrophic in character, since the spots in question were always somewhat hollowed out so as to lie below the common level of the cord and to indicate loss of substance.

The microscopic examination of these parts, which lay chiefly in the white portions of the cord, showed: 1st, total absence of normal nerve tubes and nerve cells; 2d, finely granular matter, molecules, and small globules of fat in great quantity; 3d, no granulation corpuscles; and 4th, numerous fibres which may have been degenerated nerve tubules (atrophic alteration) or connective tissue fibres, such as are found in spinal tissues.

The vessels of the cord were everywhere altered by fatty deposits, which, if I mistake not, were singularly conspicuous in the near neighbourhood of the atrophied parts. I was unable to detect a single vessel within the tissue so altered. Elsewhere, as I have said, the state of the vessels was remarkable, many of them being hidden from view by dense masses of fat molecules, through which they passed, the oil being not only deposited in their walls, but grouped in masses about their tracks.

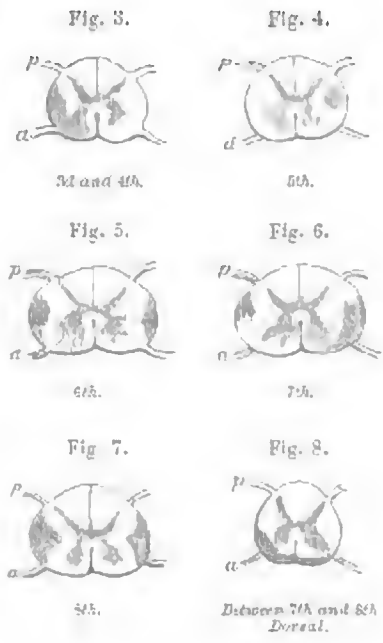
The exact situation of the gray gelatinization of the cord was studied with the most minute care. Excepting in a small spot which invaded the right posterior horn of gray matter at the level of the first cervical nerve, and a like spot on the left side in the same situation, the change respected the posterior horns and columns of the cord. In the two localities above described the microscopic changes were the same as elsewhere.

The lateral columns were extensively diseased, the spots, as a rule, lying between the anterior nerve roots and the central line of the lateral columns, affecting, therefore, most largely, the parts nearest the anterior nerve roots. (See Figs. 1 and 2.)

. . In three places the changes passed across the anterior columns. From the seventh dorsal to the eighth dorsal nerve a large spot extended across both the anterior columns. Its depth and form are indicated in Fig. 8. About the level of the tenth dorsal and at the second lumbar nerves two spots were found crossing on to the right and left anterior columns respectively, but not involving the whole width of either. Below these points I found no patches in any part of the cord.

The most extensive lesions were in the lateral columns of the cervical cord. Their surface extent is shown in the accompanying diagrams, Figs. 1 and 2. Their depth and the parts internally affected may be seen from Figs. 3, 4, 5, 6, and 7, better than from any descriptions.

The right and left lateral surface view of the lesions of the cervical cord.



Lesions in the cervical region at the level of the nerve roots, indicated by the numbers.

In the dorsal region the spots were abundant but less numerous than above, about half as many for equal areas of tissue. In many portions both of the cervical and dorsal regions the atrophy involved the point of entry of the anterior nerve roots and the gray matter of the anterior horns, as may be seen in Figs. 6, 7, and 8.

The central canal of the cord was distinct throughout, a condition usually lost during childhood.

The portion of the brachial nerve examined was in a state of remarkable integrity and presented very few atrophied fibres.

As the reports of this case state, there were the following symptoms to be explained by the condition of the nervous system:—

1. Integrity of mental and moral manifestations.
2. Absolute loss of voluntary motor power below the head, or rather below the neck.
3. Sensation, nearly perfect.
4. Respiration, good; reflex motion preserved and exhibited in the form of spasm on irritation of certain parts of the skin.

I should have thought it unlikely that there could be perfect mental power with so general an affection of the vessels of the brain; such, however, was the case, and it is interesting to observe that there was certainly no morbid softening.

The loss of volitional control is easily accounted for by the amount of disease present in the anterior columns and cornua, and in the *general* alteration of the anterior part of the lateral columns of the tissues immediately in the tracks of the emergent anterior nerve roots.

Sensation was entire, because only in one point were the posterior horns and columns at all injured. Even at this place the lesion was not more than three lines long on the left side, and was not a perfect atrophy on the other, so that it was insufficient to affect conspicuously the function of general feeling."

The phenomena presented above may be classified under three heads, viz: 1. The alterations in the nerve centres; 2. Alterations in the nutrition of the various other organs; and 3. The immediate cause of death.

1. The condition of the encephalon may be considered as nearly normal, except the presence of an excessive quantity of serous fluid, the fatty accumulations around the smaller bloodvessels, the concretion in the mouth of the fourth ventricle, the absence of the third ventricle, and the slight softening probably due to the general lowering of the nutritive functions throughout the body. In connection with the clearness of intellect manifested throughout his disease of twenty-four years' duration and up almost to the last moment of life, notwithstanding the probable existence of a large quantity of serum in the ventricles and arachnoid cavity, our attention may well be drawn to the cases described by Mr. Hilton, in his papers "On Disease and Mechanical Rest," published in the *Lancet*. The probable want of any communication between the lateral and fourth ventricles would then account for no difference being observable in the amount of paralysis in the erect or prone position. Dr. Price's statement that no sugar was to be detected in the urine is interesting in connection with the existence of the calcareous mass in the fourth ventricle.

As regards the condition of the spinal cord, nothing can be more striking than the confirmation it gives of the views of Brown-Séquard as to the mode of transmission of voluntary motor power through the antero-lateral and anterior columns. If we suppose that the long-continued over-exertion of his physical powers had caused a destruction or atrophy of a portion of the motor cells of the anterior cornua, followed by atrophic retrogressive gelatiniform degeneration of the nerve tubules proceeding from these cells, and that this process was repeated as the remaining cells were brought into excessive action to maintain the func-

tions of life, a result more closely resembling that observed in this case would be obtained than that from any other hypothesis I can form.

A most noticeable feature in the case is the absence of ordinary white or red softening.

2. The processes of nutrition in the osseous, muscular, and visceral organs were evidently enfeebled, though there was no wasting. But the softening of the bones and their congested appearance, the fatty degeneration of the heart, liver, and kidneys (though apparently recent, at least not far advanced), and the tubercles disseminated over the sub-peritoneal surface of the bowels and in the lungs, all point to a lowering of the organizing power of the system—a failure of vital force. In this connection it may be remarked that Dr. Pennock had confined himself to an almost exclusively vegetable diet for some years, under the idea that, as he could take no exercise, he ought to avoid animal food. No tubercular predisposition exists in his family: many of them have suffered from gout: an aunt was afflicted for many years with a somewhat similar paralytic affection, and another member of the family had an arrested development of one leg—probably of nervous origin.

3. There can be no doubt that the intensely inflamed, semi-gangrenous condition of the lower bowel was the immediate cause of death. His system, in its enfeebled condition, not being able to sustain the process of inflammation, succumbed readily to a cause originally slight, such as the then prevailing epidemic of influenza.

1868. *Feb. 5th. Report on Epidemics and Meteorology.*—Dr. WILLIAM L. WELLS, by appointment, presented the following report:—

The meteorological observations upon which my remarks in the present report are based, were taken by Prof. J. A. Kirkpatrick, A. M., of the Central High School, and may be found published in full in the journal of the Franklin Institute, of this city.

The year 1866 had been remarkable for extremes of temperature both of heat and of cold. The thermometer reached a higher point in summer, and a lower one in winter, than at any time for at least fifteen years. The year 1867, on the other hand, while the *thermometer* had a less range by 26° than the preceding year (91° Fahr. being the highest, and 8° the lowest temperature), was characterized by *barometric* extremes greater than at any time for at least sixteen years. The mean daily range of the barometer was also remarkably great, being 0.187, to 0.157, the mean of sixteen years; and this was not caused only by the excessive variations in one or two months, but was the case in every season of the year.

The mean temperature of the year was 53°.41, or more than a degree less than the average, which is 54°.36.

The mean of the barometer was 29.978, while the average height for sixteen years was only 29.866.

62.935 inches of rain and melted snow fell in 1867; 16 inches more than the average fall, 46.926.

The lowest point at which the barometer stood during the year was 28.778 on the 8th of May. It reached its highest point on the 11th of February, when it stood at 30.970; after which there was a long continuance of rainy weather, although the rain was not sufficient to cause floods. The rain in February was 4.82 inches, the average being 3.277; and in March it was 5.67, the average being 3.419 inches.

The mean temperature of March, 37°.58 Fahr., was very much below